

line 15 through page 7, line 12. Applicants submit that the present Amendment does not generate any new matter issue.

A clean copy of amended claims 1 and 7, appears in the Appendix hereto.

Claim 1 was rejected under the second paragraph of 35 U.S.C. §112.

In the statement of the rejection, the Examiner asserted that claim 1 is contradictory in requiring a plurality of layers formed of the same material wherein one of the layers is formed as a stress-absorbing layer, at a different hardness. This rejection is traversed.

Indefiniteness under the second paragraph of 35 U.S.C. §112 is a question of law. *Zoltek Corp. v. United States*, ___F.3d___, 57 USPQ2d 1257 (Fed. Cir. 2000); *Personalized Media Communications LLC v. U.S. International Trade Commission*, 161 F.3d 696, 48 USPQ2d 1880 (Fed. Cir. 1998); *Tillotson Ltd. v. Walbro Corp.*, 831 F.2d 1033, 4 USPQ2d 1450 (Fed. Cir. 1987); *Orthokinetics Inc. v. Safety Travel Chairs Inc.*, 806 F.2d 1565, 1 USPQ2d 1081 (Fed. Cir. 1986). Accordingly, in rejecting a claim under the second paragraph of 35 U.S.C. §112, the Examiner must provide a basis in fact and/or cogent technical reasoning to support the ultimate legal conclusion that one having ordinary skill in the art, with the supporting specification in hand, would not be able to reasonably ascertain the scope or protection defined by a claim. *In re Okuzawa*, 537 F.2d 545, 190 USPQ 464 (CCPA 1976). Significantly, consistent judicial precedent holds that reasonable precision in light of the particular subject matter involved is all that is required by the second paragraph of 35 U.S.C. §112. *Zoltek Corp. v. United States*, *supra*; *Miles*

Laboratories, Inc. v. Shandon, Inc., 997 F.2d 879, 27 USPQ2d 1123 (Fed. Cir. 1993); *North American Vaccine, Inc., v. American Cyanamid Co.*, 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); *U.S. v. Telectronics Inc.*, *supra*; *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ (Fed. Cir. 1986). Applicants stress that claims must be interpreted as one having ordinary skill in the art would have interpreted the claims in light of and consistent with the supporting specification. *Zoltek Corp. v. United States*, *supra*; *Miles Laboratories, Inc. v. Shandon, Inc.*, *supra*.

In applying the above legal tenets to the exigencies of this case, Applicants submit that the Examiner did not discharge the initial burden of providing a basis in fact and/or cogent technical reasoning to support the ultimate legal conclusion that one having ordinary skill in the art would not be able to ascertain the scope of protection defined by the claims, when reasonably interpreted in light of and consistent with the supporting specification. Simply put, the Examiner's unsupported assertion of a self contradictory claim does not discharge the initial burden of establishing a *prima facie* basis to deny patentability to the claimed invention under the second paragraph of 35 U.S.C. §112.

Firstly, claim 1 is clear. The connecting conductor members comprise a plurality of layers of the same material. One of the layers, formed as a stress-absorbing layer, has a lower hardness than the other layers. The Examiner has cited no authority to support the proposition that the same materials always necessarily have the same hardness, regardless of how they are fabricated or processed. Indeed, it is fundamental to metallurgical processing that the same metals can be formed with different properties, including hardness, depending on the manner of working or heat treatment. In this respect, Applicants would refer to page 5 of the written description of the specification,

lines 8 through 10, wherein it is disclosed that the post may be form of the single type of metal and the hardness changed by different manufacturing methods. The Examiner has not pointed to any objective evidence inconsistent with the written description of the specification which **must be presumed enabling**. See *In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995); *In re Marzocchi*, 439 F.2d 220, 169 USPQ 367 (CCPA 1971).

Based upon the foregoing, Applicants submit that the imposed rejection of claim 1 under the second paragraph of 35 U.S.C. §112 is not legally viable and, hence, solicit withdrawal thereof.

Claims 1 through 3 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al.

In the statement of the rejection, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the acknowledged prior art (Fig. 3) by forming the connecting conductor of a plurality of layers of different material in view of Ohtsuka et al. who are said to disclose forming a connecting conductor of a plurality of layers. This rejection is traversed.

Firstly, as recognized by the Examiner, the semiconductor device defined in independent claim 1 comprises a connecting conductor including a plurality of layers formed of the same material. This feature is neither disclosed nor suggested by the acknowledged prior art, Ohtsuka et al. or Omoya et al. Accordingly, even if all the applied references are combined in some manner, and Applicants **do not** agree that the

requisite motivation has been established, the claimed invention would **not** result.

Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

Applicants would point out that Ohtsuka et al. merely disclose a plurality of **barrier layers** between electrode pads and external terminals. Omoya et al. merely disclose the insertion of an anisotropic conductive film entirely between a semiconductor chip and a mounting substrate. These structures are, manifestly, quite different from the claimed invention.

Furthermore, independent claim 1 specifies that the plurality of connecting conductors extend **beyond** the outer outside surface of the protective insulating film. What the Examiner has apparently interpreted as a conducting conductor of the semiconductor device disclosed by Ohtsuka et al., is **not a connecting conductor** that protrudes from the protective insulating layer, **but part of the insulating layer itself** and serves as diffusion barriers. The layers identified by the Examiner do **not** extend **beyond** the protective insulating layer. In fact, there are no connecting conductors to the protruding contacts 37.

Moreover, Applicants do **not** agree that the requisite motivation of element has been established. Specifically, it has been repeatedly held by the Court of Appeals for the Federal Circuit that in order to establish the requisite motivation the Examiner must make "clear and particular" factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify a specific prior art device (the Fig. 3 device) to arrive at the claimed invention based upon facts--not generalizations. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); *Ecolchem Inc. v. Southern California Edison, Co.*

227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); *In re Kotzab*, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999). In so doing, the Examiner is required to explain **why** one having ordinary skill in the art would have been realistically motivated to modify the Fig. 3 device to arrive at the claimed invention based upon the teachings of the secondary references. *Ecolochem Inc. v. Southern California Edison, Co, supra.*; *In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998). That burden has not been discharged.

Specifically, the Examiner merely points to diffusion barriers within a protective insulating layer and then concludes that one having ordinary skill in the art would somehow have been motivated to employ plural layers for the connecting conductor 4 of the Fig. 3 device which extends completely beyond the protective layer 3 and encapsulated by resin. Clearly, the diffusion barriers of Ohtsuka et al. perform a different function from that performed by the connecting conductive 4 of the Fig. 3 device.

Moreover, the Examiner is apparently predicated the rejection upon the determination that **upon** combining Ohtsuka et al. with the Fig. 3 device, the requirement of claim 1 for a stress-absorbing layer having a lower hardness would **inherently** be met. Firstly, inherency requires **certainty, not speculation**. *Finnegan Corp. v. ITC*, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); *In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999). It is **not** apparent why the thin diffusion barrier layers of Ohtsuka et al., including that made of gold, would inherently, i.e., necessarily, serve as a stress-absorbing layer. Further, the Examiner's approach is apparently based upon the theory that **if** the Fig. 3 device is appropriately modified, **then** the claimed invention would result. This approach has been repeatedly judicially condemned as confusing

obviousness with inherency. *In re Rijckaert*, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); *In re Shetty*, 566 F.2d 81, 195 USPQ 753 (CCPA 1977); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).

Applicants separately argue the patentability of **claims 2 and 3**. The Examiner has concluded that one having ordinary skill in the art would have been motivated to further modify the acknowledged prior art device by forming the connecting conductor ".... from an isotropic conductive material containing metal particles to reduce the mechanical stress for the interconnection...." (third full paragraph on page 4 of the January 3, 2002 Office Action). Applicants disagree. Firstly, it is **not** apparent and the Examiner has **not** identified wherein the purpose of reducing mechanical stress for the interconnection is disclosed in the applied prior art, or that the problem of mechanical stress is even recognized. Merely pointing to features of a claimed invention perceived to reside in disparate reference does not establish the requisite realistic motivation. *In re Kotzab*, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); *Grain Processing Corp. v. American-Maize Products Co.*, 840 F.2d 902, 5 USPQ2d 1788 (Fed. Cir. 1988).

Based upon the foregoing it should be apparent that a prima facie basis to deny patentability to the claimed invention have not been established. Moreover, there is a potent indicium of nonobviousness which requires consideration.

Specifically, it is well settled that the problem addressed and solved by a claimed invention must be given consideration in resolving the ultimate legal conclusion of obviousness under 35 U.S.C. §103. *North American Vaccine, Inc. v. American Cyanamid Co.*, 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); *In re Newell*, 891

F.2d 899, 13 USPQ2d 1248 (Fed. Cir. 1989). Applicants address and solve the problem of cracking in conventional CSP packages as a result of a difference in coefficients of linear expansion between the semiconductor chip 1 and the ceiling resin 5 (Fig. 3). It is **not** apparent and the Examiner has **not** identified wherein that problem is even recognized in the applied prior art, let alone addressed and a solution offered. Under such circumstances, the **problem** addressed and solved by the present invention is entitled to consideration as an indicium of **nonobviousness**.

Conclusion

It should be apparent from the foregoing that a prima facie basis to deny patentability to the claimed invention has not been established. Moreover, upon giving due consideration to the problem of CSP packing addressed and solved by the claimed invention due to a difference in coefficients of linear expansion between the semiconductive chip and sealing resin, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. §103. *Jones v. Hardy, 727 F.2d 1524, 220 USPQ 1021 (Fed. Cir. 1984)*. Applicants, therefore, submit that the imposed rejection of claims 1 through 3 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 4 through 6 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al., Omoya et al. and Matsumoto et al.

In the statement of the rejection, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify whatever semiconductive device can be said to have been reasonably suggested by the combined disclosures of the acknowledged prior art, Ohtuska et al. and Omoya et al. and Applicants do not agree that the requisite motivation has been established, by stacking a plurality of conductive layers in view of Matsumoto et al. The Examiner also resorted to the "matter of design choice" rubric (second full paragraph on page 5 of the January 3, 2002 Office Action). This rejection is traversed as factually and legally erroneous.

Firstly, claims 4 through 6 depend from independent claim 1. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al. and Omoya et al. Specifically, imposing in the rejection the Examiner has apparently not focused upon the limitation in claim 1 requiring the connecting conductors to include a plurality of layers formed of the same material, with one of the layers formed as a stress-absorbing layer having a lower hardness than other layers. The relied upon Ohtsuka et al. reference discloses different barrier layers disposed between electrode pads and external terminals. Moreover, the barrier layers are an within the dielectric protection layer 34 (Fig. 3 of Ohtsuka et al.) and do not extend or project beyond the protective layer. The Examiner has not established the requisite realistic motivation which would have impelled one having ordinary skill in

the art to modify the acknowledged prior art device by forming the connective conductive member, an element which does not even exist in the device disclosed by Ohtsuka et al., of a plurality of layers merely because Ohtsuka et al. provide diffusion barrier layers within the protective dielectric layer. Moreover, and to whatever extent the Examiner is relying upon the doctrine of inherency, i.e., that if the prior art device is modified by providing a plurality of layers, then one of them would necessarily serve as a stress-absorbing layer, such an approach lacks the requisite certainty and confuses obviousness with inherency. *In re Rijckaert, supra.*; *In re Shetty, supra.*

Moreover, Applicants separately argue the patentability of **claims 4 through 6**. Specifically, as previously stressed, in order to establish the requisite realistic motivation, the Examiner is required to explain **why** one having ordinary skill in the art would have been realistically motivated to modify whatever semiconductor device can be said to have been suggested by the combined disclosures of the acknowledged prior art, Ohtsuka et al. and Omoya et al., by stacking conductive layers having substantially identical or different diameters, based on facts. *Ecolochem v. Southern California Edison, supra.*; *In re Rouffet, supra.* The Examiner has merely pointed to Matsumoto et al., who does **not** relate to packaging but to **wiring circuitry within the device itself**, not for external connections. Applicants stress that Matsumoto et al. merely disclose an **internal** structure of a semiconductor chip; Matsumoto et al. do **not repeat not**, disclose a connection structure between electrode pads and external terminals. Obviously, conductive wirings are staggered within the semiconductor device since the wiring pattern defines circuitry. But this has nothing to do with a connecting conductor between the chip itself and the solder ball for external connection.

The "manner of design choice" approach has been repeatedly judicially condemned. There is no substitute for the requisite factual findings to support the motivational element. See, for example, *In re Chu*, 66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995); *In re Gal*, 980 F.2d 717, 25 USPQ2d 1076 (Fed. Cir. 1992); *In re Bezombes*, 420 F.2d 1070, 164 USPQ 387 (CCPA 1970). Reliance upon the "matter of design choice" rubric in the present situation is particularly erroneous, since the staggering of the layers of the connection conductor is functionally significant in alleviating stress. The Examiner's approach relies too much on generalizations and too little on facts. *Ruiz v. A.B. Chance, Co.*, *supra.*; *Ecolcohem v. Southern California Edison*, *supra.*; *In re Kotzab*, *supra.*; *In re Dembcizak*, *supra.*

Applicants would note that Matsumoto et al. do not teach that staggering layers reduces mechanical stress and improves bonding strength of the interconnection. Matsumoto et al. merely disclose interconnects to form the **internal** circuitry of the semiconductor chip--**not external connections**.

Moreover, as previously pointed out, the applied prior art neither recognizes nor addresses the stress problem addressed and solved by the claimed invention. The absence of a prima facie case coupled with a potent indicium of nonobviousness compels the conclusion that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of the 35 U.S.C. §103. *Jones v. Hardy*, *supra.*

Applicants, therefore, submit that the imposed rejection of claims 4 through 6 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in

view of Ohtsuka et al., Omoya et al. and Matsumoto et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 7 and 8 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al.

This rejection is traversed.

Specifically, Ohtsuka et al. do not teach or disclose a connecting member having a plurality of layers. Ohtsuka et al. merely disclose a plurality of diffusion barriers within a protective dielectric layer. In accordance with the semiconductor device defined in claim 7, the connecting conductors extend beyond the outer surface of the protective insulating layer. Being the case, it is not apparent and the Examiner has not explained **why** one having ordinary skill in the art would have been realistically impelled to modify the Fig. 3 device by providing a plurality of layers of different material to form the connecting conductor, merely because of the diffusion barriers disclosed by Ohtsuka et al. within the protective insulating layer. *In re Rouffet, supra*. To whatever extent the Examiner is relying upon the doctrine of inherency, such reliance is misplaced for lack of certainty in concluding that one of the layers would necessarily observe stress and in confusing obviousness with inherency. *In re Rijckaert, supra; In re Shetty, supra*. Moreover, the problem addressed and solved by the claimed invention, i.e., stresses caused by a difference in coefficients of linear expansion between the semiconductor chip and sealing resin, is not recognized or addressed by the applied prior art.

It should, therefore, be apparent that a prima facie basis to deny patentability to the claimed invention has not been established for lack of the requisite factual basis and want of the requisite realistic motivation. Moreover, upon giving due consideration to the problem addressed and solved by the claimed invention, the conclusion appears inescapable that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** obvious within the meaning of 35 U.S.C. §103. *Jones v. Hardy, supra*.

Applicants, therefore, submit that the imposed rejection of claim 7 and 8 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al. and Omoya et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 9 through 13 were rejected under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art in view of Ohtsuka et al., Omoya et al. and Matsumoto et al.

This rejection is traversed.

Specifically, claims 9 through 13 depend from claim 7. Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 7 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al. and Omoya et al. Specifically, the Examiner has failed to provide objective evidence to support the conclusion that one having ordinary skill in the art would have been realistically motivated to modify the Fig. 3 device to arrive at the claimed invention based upon facts. In this respect, Applicants again note that the

semiconductor device disclosed by Ohtsuka et al. does not even have a connecting conductor as in the claimed invention which extends beyond the outer surface of the protective insulating layer. The relied upon diffusion barrier layers are in the protective insulating layer of the device disclosed by Ohtsuka et al. It is not apparent and the Examiner has not explained **why** one having ordinary skill in the art would somehow been realistically impelled to deviate from the Fig. 3 device by forming connecting conductors that extend beyond the outer surface of the protective insulating layer merely because of the diffusion barriers disclosed by Ohtsuka et al. within the protective insulating layer. Further, Matsumoto et al. do not relate to connective conducting layers but merely to an interconnect pattern defining internal circuitry. It is not apparent and the Examiner has not explained why one having ordinary skill in the art would somehow been realistically motivated to modify the single connecting conductor of the Fig. 3 device by forming a plurality of staggered layers of different material, merely because of the conventionality of an interconnection pattern disclosed by Matsumoto et al. which does not relate to a connecting conductor to a bump external terminal. Further, as also previously argued, the applied art neither recognizes nor addresses the cracking problem addressed and solved by the claimed invention.

It should, therefore, be apparent that a prima facie basis to deny patentability to the claimed invention has not been established. Further, upon considering the problem addressed and solved by the claimed invention as a potent indicium of nonobviousness, Applicants submit that one having ordinary skill in the art would **not** have found the claimed invention **as a whole** within the meaning of 35 U.S.C. §103. *Jones v. Hardy, supra.*

Applicants, therefore, submit that the imposed rejection of claims 9 through 13 under 35 U.S.C. §103 for obviousness predicated upon the acknowledged prior art (Fig. 3) in view of Ohtsuka et al., Omoya et al. and Matsumoto et al. is not factually or legally viable and, hence, solicit withdrawal thereof.

Based upon the foregoing, it should appear that the imposed rejections have been overcome and that this application is in clear condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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